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MEASURRING LEDS INDICATRISSE

Annotation. This paper describes one of the cheap and simple methods for determining the shape and orientation of the indicatrix of LEDs. Also, the article presents the results of experiments on the measurement of LED indicatrices.
Key words : LED, indicatrices, measurement.

INTRODUCTION

For many systems, it is necessary to provide a given indicatrix. But in most cases, the LEDs differ from the matting parameters both in the orientation of the indicatrix and in its form. Therefore, it is necessary to have the means to quickly and cheaply measure the indicatrix. The purpose of this work is to create a device and software to automatically determine the indicatrix of the LED.

KNOWN METHODS

The most common method of measuring the indicatrix is the goniometric method. The method is based on step-by-step fixation of the values of the light intensity of the LED when it is rotated at a known angle. The instruments used for this purpose are a goniometer with a sufficient angular resolution and a photometric head with a known conversion factor. Reducing the measurement error and obtaining the most reliable angular distribution is possible with the minimum step of the angle of rotation of the LED relative to the photometer (or vice versa). Modern goniophotometric installations have a step of several angular minutes. [1]

Although this method is accurate, it can take a lot of time.

VISHAY uses the following method: an external swivel bracket with an angular scale is installed to measure the LED. After measuring the axial light intensity (angle setting 0 °), the installation is rotated left and right until the light intensity values fall to half this basic value. Then two angles of semi-intensity can be read from the angle scale. For fast automatic measurement, a photodiode array can be used; It is located in a circular shape around the LED for measurement. Then evaluate the data using a microcomputer. It should be noted that the measurement of the breakdown voltage, if it is performed without special attention, can lead to the destruction of the device under test. Only a precision current source will be fast enough to provide a constant current in the LED without spikes. DC voltage sources in current limiting mode are not applicable at all. AllnGaP LEDs in particular are susceptible to destruction. Therefore, the matching voltage of the current source should be limited to a maximum of 10 V. If the actual value of the breakdown voltage is of little interest, it is recommended to measure the reverse current at a fixed reverse voltage. On the other hand, it is rather difficult to get stable readings with standard test equipment, because the reverse current values of LEDs usually lie in the range of nanoamp or even picoamp. [2]

This method is faster, but if more than 100 diodes are to be measured then it will take a lot of time.

DESCRIPTION OF THE PROPOSED METHOD

The essence of the method is shown in Fig.1.

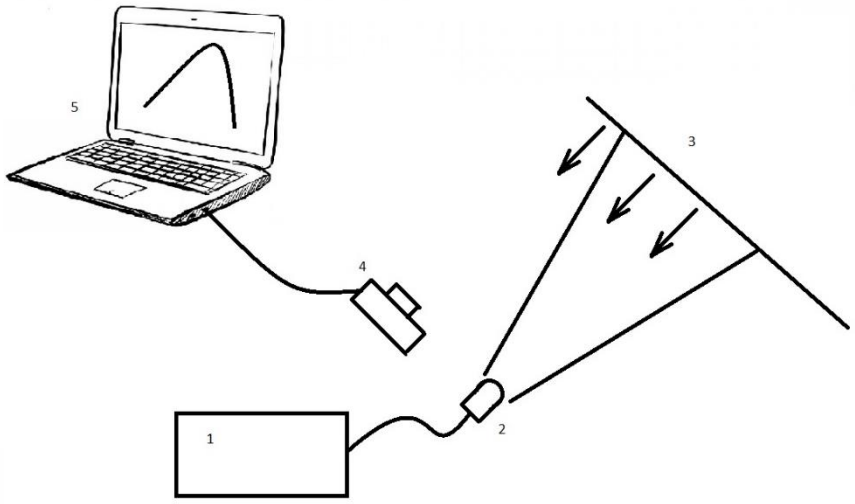

Fig. 1 - Functional scheme of the method

The method is based on the fact that the diode (2) is fixed motion at a certain distance (d) from the screen (3). A diode supplies a current of a certain voltage and power from the power supply unit (1), which is also a control unit for changing the current or voltage. A light propagation image appears on the screen. This image is recorded by the camera (4) and fed to the PC (5) where it is processed. On the PC, the indicatrix image is displayed. Next you need to compare the received indicatrix with the deducted. To do this, use the light dependence formula (E):

$$E = \frac{I * (\cos(\theta))^{g+2}}{d} \qquad (1)$$

where I – is the intensity normal to the source itself and m > 0.

EXPERIMENTAL PART

The experiment used was the installation shown in Fig. 2.

Fig.2 - Experimental installation

As test object diode TSAL6100 was used.

By inserting a test object, a photo with radiation propagation was received. Next, with Matlab, we obtained graphs of illumination of pixels, which is indicative radiation of a light-emitting diode, and comparison of this distribution with the graph

obtained from the formula (1). The fig.3 shows the original image. The results are shown in Fig.4.

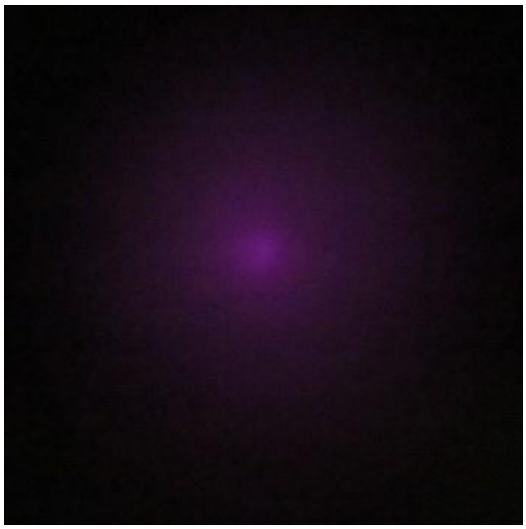

Fig.3 – Original image

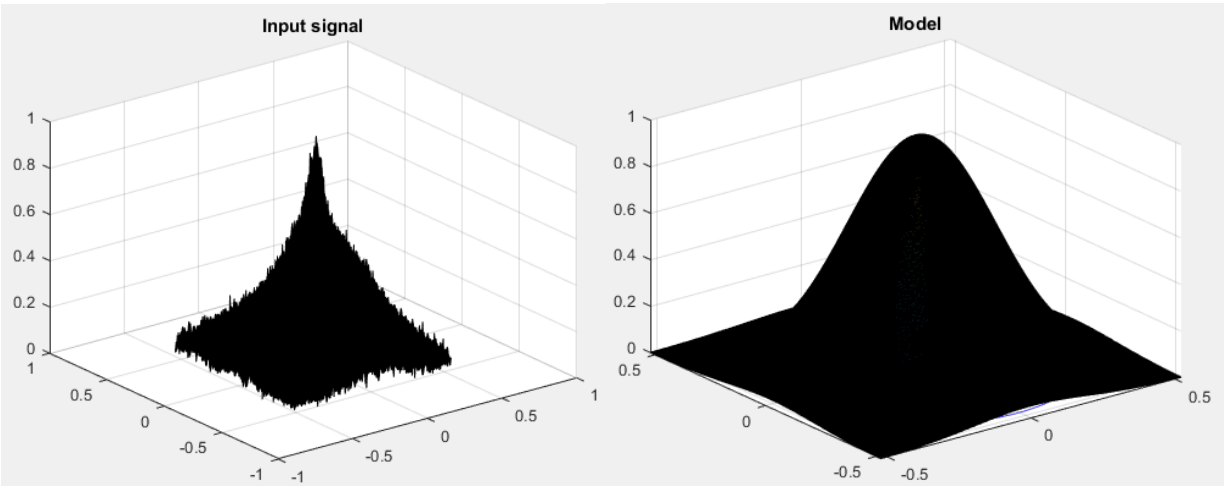

Fig.4 – Results

CONCLUSION

The presented method, though not highly accurate, can be used to quickly check the indicatrix of LEDs and make a decision whether this LED is suitable or not.

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